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Journal of the Society of Arts.

FRIDAY, APRIL 20, 1855.

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EIGHTEENTH ORDINARY MEETING.

Wednesday, April 18, 1855.

The Eighteenth Ordinary Meeting of the One Hundred and First Session, was held on Wednesday, the 18th inst., Thomas Winkworth, Esq., Member of Council, in the Chair.

The following Candidates were balloted for and duly elected :—

Baylis, Alexander J.
Burton, Charles H.
Cramp, Francis
Crawford, Robert W.
Gilbert, Dr. Joseph Henry
Hankey, Thomson, jun., M.P.
Herbert, John Maurice, M.A.
Jonson, Arthur
Keeling, Alfred
McGregor, Peter
Oxley, J. Stewart
Philips, Sir George R., Bart.
Price, George
Rixon, Alfred H.
Young, Francis Mortimer

The paper read was

NOTES ON THE REVISION OF ARCHITECTURE IN CONNECTION WITH THE USEFUL ARTS, WITH SPECIAL ILLUSTRATIONS OF THE VENTILATION OF ST. GEORGE'S HALL, LIVERPOOL.

By D. B. Reid, M.D., F.R.S.E.

The object of this communication is to submit to the consideration of the Society some propositions connected with the improvement of architecture, and to explain some special points connected with the ventilation introduced at St. George's Hall, Liverpool.

Few questions perhaps have attracted more attention in modern times than the revision of architecture demanded by the general progress of discovery during the last century, and the application of new and more extended resources in ministering to the improvement of public buildings and of the habitations of the people.

Nevertheless, with all these means and appliances, the amount of real progress does not as yet meet the wants of society, and public attention is only now being thoroughly awakened to the fact that architecture is in many respects in a state of transition, and that it never can attain its highest development, till this state of transition shall be thoroughly understood and appreciated, and met in a spirit that shall identify it with all the wants and circumstances of that being for whose use it is especially intended.

The right adjustment of the relative claims of the fine and useful arts, where they meet or interfere, forms the very root and basis of all that is most important, more especially in public buildings. Nothing can attain the highest order of beauty that attempts to do so at the expense of an admitted want. In an assembly room, accordingly, for conversation or debate, or in a church, a court of law, or a school-room, a defective acoustic arrangement cannot be compensated by any amount of decoration, and in the same manner, no brilliancy or beauty of any artificial system of illumination, can make up for any deficiency that renders it more conspicuous as an object of art, than useful as a means of giving that illumination of the countenance which is the best test of a good approximation to the clear and equally diffused light of day.

And though none may go the length of denying such reasonable propositions, it is not the less notorious that the style and type of an architectural structure too often becomes the principal object of attention, instead of being merely the means of carrying out those higher objects for which it was intended.

Special adaptation to an end must ever be regarded as the great aim and object of all human ingenuity, and it is seldom that any collateral benefit can be accepted in place of the primary object, though the blending of the beautiful and the useful must ever be held as the highest triumph of art.

The magnificence and grandeur of a St. Paul's and a Westminster Abbey, with all their hallowed recollections, have a mission of their own, which speaks even from their silent walls in a language not to be misunderstood. A Crystal Palace also has its own mission in another field, being at once one of the greatest monuments of art and science, and one of the most valuable means of promoting their progress. It is not, however, to such buildings that we allude at present, but to those required for the every-day purposes of life and public business. In them the style of architecture must often be regarded as the accidental dress which they wear, whether Grecian, Gothic, or however different from these, while the stability, the accommodation, the lighting, the acoustics, the ventilation and the warming form the realities that ought to be secured, and take precedence of all decoration.

We by no means desire to say that the objects we advert to are altogether overlooked. We do not say that there are not numerous instances of the most laudable zeal, and of a highly successful practice in carrying them out. But we do affirm that the important practical question "what is architecture" is not always so thoroughly entered on, nor so practically sifted, as the nature of the case requires, and that this occurs to an extent that renders it desirable for everyone to record his experience wherever he has reason to believe that it may in any way promote so great an object.

Knowledge and discoveries in practical science have advanced in modern times with a rapidity altogether unprecedented. In architecture, in particular, new facts, new details, and new resources have multiplied on every side. What, then, can be more important than the right organisation of the means by which these resources can be most effectually applied, and how can that reorganisation be effected, except by the careful consideration of the existing practice, and the varied anomalies it presents.

The progress of architecture affects not merely the general comfort and well-being of society and the duration of human life, but the right conduct of business in all public edifices; and having had the opportunity of taking a part in many proceedings connected with the acoustics of public buildings, and the progress of sanitary improvement, I venture to submit to your notice the following notes explanatory of the propositions with which I shall conclude :—

In the year 1833, a building was erected at Edinburgh, that became soon afterwards the basis of plans that have been introduced in numerous public works, and in promoting the improvement of the habitations of the people. It was constructed for lectures and experimental purposes, and the arrangements adopted were founded on results that had arisen from many previous investigations. It presented, in particular, very extended resources for the production and communication of heat, for artificial illumination, and for the instantaneous removal of all noxious gases and vapours evolved during every variety of experimental operations. The general ventilation of the building was also the subject of special attention. The communication of sound, when tested by vocal and instrumental music, as well as by the purposes to which it was applied, was admitted to be clear and distinct, and to be sustained without effort either on the part of those who spoke or those who heard; neither was there any echo nor offensive or prolonged reverberation.

Four walls, and sixteen pillars, each of them a shaft or chimney stack, supported the roof. No fuel was used except gas and prepared coke, unless when required for experimental purposes.

A large central shaft commanded numerous fires, and furnaces, and flues, extending under-ground to every part of the building.

The smaller shafts, which were about 17 feet high, had each an internal flue nine inches square, which was found sufficient to command four ordinary fires, or four small furnaces, each capable of reducing iron from the ore in a Hessian crucible, and giving a button of the metal in analytical experiments.

The conclusions which the occupation of this building pressed on my attention were the following, some of which, as is well known, had engaged attention in former times, though introduced here to give a more complete view of the result of present and past experience:—

1. That the amount of air supplied in general to crowded buildings is far below the standard requisite for the preservation of health.

2. That the ingress of air by an extensive system of diffusion is the great desideratum in practical ventilation, and the most difficult to be secured where special provision is not made for this purpose.

3. That a sustained power can alone regulate and maintain proper ventilation in crowded buildings, or preserve it from the influence of external currents.

4. That air entering a crowded public building ought not to be admitted by ordinary windows, but by special apertures and channels, in which it could be tempered to any extent required.

5. That the milder and more extensive the heating surface, the less injurious was the effect on the quality of the air supplied.

6. That the products of combustion from gas, or any other means of artificial illumination, should be removed as directly from the general atmosphere as the products of combustion arising from any fire or furnace, when not necessarily carried off at once by the general movement of the air.

7. That in any system of artificial illumination, the imitation of the diffused light of day is the great and important desideratum, and not the concentration of great power in one or a few lights.

8. That illumination at the cornice, at the ceiling, or above the ceiling, by a special system harmonising with the general architecture and incorporated with it, would lead to important practical results, and admit of the entire exclusion of products of combustion.

9. That a low roof, combined with a powerful reflection of sound there, and a floor highly absorptive of sound, and apertures by which it could escape, tended largely to improve the communication of sound.

10. That ventilation, acoustics, and artificial illumination, should form primary subjects of consideration in public edifices, and can only be put on the most desirable footing when architects shall come generally to take the same interest in them that they do in the style and artistic features of any work in which they may be interested.

11. That the extension of the use of gas and of prepared soft coke, may be advantageously adopted for all ordinary purposes where heat is required, to the total exclusion of raw bituminous coal, and with the entire prevention of soot or visible smoke.

12. That the general progress of architecture and sanitary improvement, requires that the public be made more familiar with the nature and properties of the materials that more immediately affect the human frame and influence the health in the habitations in which we dwell, and in the varied engagements with which man is occupied. Without this no proper management can be secured, either in the general preservation of health, or in the combination of those sanitary provisions that require all the united co-operation that can be obtained from the resources of the medical profession, the architect, the engineer, and the agriculturist.

I shall now advert more specially to some of the principal topics enumerated, so far as may be practicable in this communication.

SOUND.

There are not many points connected with the practice of architecture where greater discrepancy exists than in the provisions made for the right communication of sound. In many cases it is obvious that this question has been left to take its chance; in others dependence has been placed on the imitation of examples; and, in some, specific rules have been pursued with various success.

To restrict myself to what has come personally under my own observation, abroad and at home, I would say that systematic attempts at acoustic arrangements do not generally receive the consideration they deserve, and are often utterly and entirely neglected.

Few reflect on the tear and wear of the voice of the speaker where he has to adopt it to incongruous circumstances. Whenever the speaker is in difficulty from this cause a corresponding anxiety is felt on the part of those who hear, and the public business is needlessly protracted, carried on with difficulty, and not unfrequently attended with grave mistakes.

It is not to be expected that these defects will be reduced materially till acoustics shall become a primary instead of a mere secondary object of attention in the practice of architecture; till they shall be held of sufficient importance to insure an alteration of design when necessary, and till the science of acoustics shall receive some of that popular attention and elucidation which has been so happily bestowed on optical science.

In different cases to which I have been called, an extreme altitude in the roof was one of the principal sources of evil, and the absence of reflective power on the line of speech and hearing. The voice appeared to be lost, or was sustained with difficulty. By lowering the ceiling, and the introduction of a good reflecting surface, inclined, as much as circumstances permitted, towards the benches occupied, the principal defects were obviated.

In other instances great improvement ensued when a lining of sheet-iron was placed around the wall, and opposite the line or zone of speech, by which I mean the space immediately opposite those who either speak or listen.

In a third series of cases, the great defect having been excessive reverberation, by removing lath and plaster ceilings, and opening them up in every direction, a sufficient escape for superfluous sound was made, and a perpetual noise removed that had previously been equally painful and offensive to those engaged in the apartments.

In a fourth series, the introduction of local reflectors, or absorbers of sound, would often satisfy everything requisite.

But the most important results in rooms for debate or lecture, were always obtained where a low ceiling, or a great reflecting power from still lower walls, was accompanied with such numerous apertures, or such an amount of absorbing surface, that the sound which had once affected the ear never continued to linger on it, but left the course clear, as it were, for the full effect of each succeeding syllable.

It is perfectly true that the room or apartment that may be deficient in acoustics to one, may not be so to another, and that reports on such points can only be received after a careful generalisation of the facts; but, looking to the whole question, it is maintained that the leading phenomena of acoustics as exemplified in all our principal buildings, may be easily and satisfactorily explained, and that we have only to pursue and apply the admitted laws of the production, propagation, reflection, and absorption of sound, to obtain more satisfactory results than are generally secured.

It is a desideratum, however, to extend the inquiries that have been made on this subject to the adaptation of the voice to each particular structure. A soft and gentle voice, or musical performance, may often be heard in perfection, if enunciated slowly, where nothing but confusion would prevail with louder notes, or a more rapid articulation.

It is not the less important, therefore, to bear in mind that the acoustics of special rooms have often been condemned where the fault lay not in its construction, but in the defective elocution of the speaker, who did not know how to manage his voice. With all the power and habits of debate to which the customs and institutions of the country naturally lead, it will be admitted that the cultivation of a clear and distinct elocution is not always characteristic of those who address public assemblies. And if this be the case, it is still more important that they should pay some attention to acoustics, as often some alteration of position, or in the direction of the voice, a sound a little louder or a little softer, or dwelling a little longer on each syllable by merely speaking slower, will enable many to be heard with facility who may be otherwise scarcely intelligible.

The grand object of the architect is to treat the room as if it were itself a part of a musical instrument, and to bring in all the appliances that will sustain sound to the required point, and discharge or suppress it whenever it has done its duty. And here a wide field is open for the use of glass, metal, and wood, in all those varied conditions in which they conduce most powerfully to sustain and propagate sound, arresting their action when the required intensity is given without producing prolonged reverberation.

With a ceiling or walls softened by drapery, or covered by a porous or perforated structure, that prevents reflection, any form of building may be adopted, provided sufficient strength of intonation can be secured to fill the requisite area, and sufficient silence maintained to prevent interruption.

Ventilation.

It would be difficult to give any good reason why ventilation should not form a primary object in architecture. Without the proper renewal of air, life stagnates or becomes depressed in proportion to the amount of deprivation, and in all crowded buildings the quantity required for use is so great that thin and attenuated as the air may be, it soon exceeds by many times the total weight of all the materials used in their construction. How is so large an expenditure to be maintained without some special provision? How is such a special provision to be secured without a marked effect upon the architecture?

The mere adjustment of apertures, such as doors and windows give, will be sufficient to regulate an imperfect system of ventilation; but wherever the highest degree of certainty and precision are required, there must be a constant force capable of withdrawing any amount required, and for the introduction of as much air as is removed.

But the room or apartment being crowded, where is the air to enter, and how can it be admitted with sufficient gentleness so that it shall fall softly on the person, and not be productive of evils, as serious, or even more so, to some constitutions than the tainted atmosphere they may have been breathing.

In one series of experiments made on this subject the leading peculiarity was the free admission of air given from a very large space or reservoir on one side of a lecture-room seated for 300 persons, but containing on many occasions a considerably larger number. The opening in question exceeded 400 feet in area, and gave the room the appearance of the wall on one side having been in a great measure left out. In one point of view, the lecture-room might be regarded as merely part of a much larger apartment, with which it was in free communication by this opening, there being means of renewing the air to any required extent.

When in occupation, a broad wave of air inclined from the reservoir to the seats at a lower level, and a corresponding movement of vitiated air proceeded from a higher level in the opposite direction. Fresh air constantly gained access to the reservoir below, and vitiated air was as constantly carried off above. But there neither was ingress nor egress around or near the person except what ensued by the gentle movement of this broad flowing and returning wave. The result was on the whole very satisfactory, but in summer, as is usually the case, greater assistance was required in securing an adequate discharge than in winter.

In another series of experiments, a chamber was formed between the ceiling and the roof, and the entire ceiling was made of a porous material that arrested any sudden descent of cold air, but permitted any movement dependent on the relative condition of the air above and below the ceiling, and the consumption required for a common fire, or the waste occasioned by a ventilating flue. This arrangement converted the whole ceiling practically into an open window, so far as ventilation came into consideration, freed from all that inequality that usually attends the unguarded action of the external air, and admitting and discharging air according to the ever varying circumstances of the moment.

In a third experiment, the same general principles were observed, but the diffusion of the air was carried to a still greater degree by extending the porous chamber from the ceiling to the walls, and thus carrying the diffusion to the greatest limits practicable, without bringing into operation the use of the floor.

A further series of experiments was then made, in which the floor itself was made of porous materials, supported on a perforated frame, to meet cases where it was impracticable to gain sufficient ingress in any other mode, and proper precautions were taken, to use the perpendicular surfaces largely, and to guard against the ingress of dust by an efficient system of cleansing. The direct ingress and passage of air from the floor to the ceiling, by a system of universal diffusion, had many advantages that counterbalanced in local positions the disadvantages naturally attending it.

In a fifth series of experiments, a small descending power was placed on every portion of the floor which the foot was apt to touch, so as to carry away by a special channel as much air as would make an inclination in that direction, while the ascent took place from all the rising steps and such portions of the floor as were rarely or never touched by the foot.

In a sixth series, the air entered solely by the ceiling, and was discharged principally at the same level, a gentle, limited descent being maintained by the floor.

In a seventh series, complete power was secured in the movement of air from the floor to the ceiling, or from the ceiling to the floor, and the relative effects of an ascending and a descending movement tried upon the same audience, in numbers amounting to 240, the current being reversed from time to time, till clear proof was obtained of the advantages and disadvantages of the ascending and descending movement.

From all these investigations, under circumstances where no style of architecture, decorations, or any other cause limited the inquiries made, it became evident that systematic ventilation in crowded buildings is far too extensive and important a subject to be dealt with economically, except by arrangements incorporated with the original structure.

That the right temperature and diffusion of the entering air are the points on which all difficulties usually turn, when a proper supply and discharge have been secured; that in public buildings with a variable attendance, nothing meets so effectually all contingencies within, and the changing condition of the external air without the walls, as a fixed power capable of moving any required amount of air.

That a shaft, or chimney tower, is the most manageable and uniform power capable of universal application.

That a mechanical power can be used in conjunction with a shaft in producing a more balanced atmosphere than either can give separately, the one being made to force in just as much as the other withdraws.

That in proportion to the perfection of the structural arrangements by which the utmost freedom of access is given to the air entering any building, and the less it is overcrowded, the more satisfactory will be the results, and the less costly the means required for sustaining adequate ventilation.

That the removal of special sources of injury to the external atmosphere of any building, should be the first step taken in connection with any system of ventilation.

That a vacuum or exhausting power should be placed on all sewers in large cities, especially where tidal rivers or other causes render them liable to temporary obstructions.

That it is vain to conduct any system of ventilation where lobbies, passages, and external doors and windows, are not under sufficient control.

That in ordinary habitations, one great desideratum still too seldom provided is a sufficient infusion of air into passages and staircases, so as to admit of the whole supply being obtained from this source in cold weather, and tempered to any required degree.

That the ingress of air in individual apartments comes next in point of importance, where its entrance is generally too much opposed in consequence of the want of that amount of diffusion that is necessary to break the severity of its impulse.

That an ingress above, around, or in the immediate vicinity of a fire-place or stove, with a proper supply of moisture, removes the most objectionable source of draughts where the air is not previously tempered, and that a discharge from the highest level can alone secure with certainty the most effective removal of vitiated air.

That in the habitations even of the humblest class the right construction of the window, and an effective system of diffusion of air permitted to enter and escape at the ceiling, is the great desideratum; that the too limited amount of this diffusion, and the consequent local currents of cold air, has hitherto been the practical cause why ventilation has been so much opposed in those apartments that were most in want of it, and that these arrangements, with a proper fire-place, can be executed at a cost that can be more than saved by a slight reduction in altitude, which is more than compensated by the ventilation thus secured.

LIGHTING.

The third point to which we desire to request attention comprises some of the principal experiments made in artificial lighting.

The first series consisted in the aggregation of fish-tail burners, so as to use them in the form of compound burners, or in a position where the products of combustion necessarily ascended till they escaped.

In the second series, illumination was given from the cornice at a level, and under circumstances that equally insured the removal of products of combustion.

In the third series the cornice illumination was effected in a metallic chamber, that constituted the actual cornice, a glazed front converting the chamber into an illuminated cornice, presenting any decoration that might be desired.

In the fourth series, lamps were formed so as to appear parts of the decorations of the ceiling, the products being entirely removed by ascending or descending currents.

In the fifth series, the lights were altogether excluded, and placed above the ceiling, the desire being to imitate the diffuse light of day.

In the sixth series, the same effect was produced practically by converting numerous panels in the ceiling into reflectors, and throwing down the light from an unpolished convex surface.

It will be obvious, that in following out the extended systems of illumination contemplated by most of these methods, and in removing, without recoil, products of combustion from any ordinary lamps putting in motion an immense body of air, the systems of decoration in any public building must necessarily be more or less affected.

Further, I could name, were it necessary, public buildings of the highest importance, where the system of lighting was not even defined, much less incorporated with the works, till it was too late to make the necessary provision, either with the economy or effect that might have been introduced by previous arrangements.

In the introduction of gas at the Houses of Parliament twenty-four hours only were available for the first illustration, submitted in 1837 to the deceased Lords Melbourne, Bessborough, and Durham. Those who are conversant with the details of gas illumination will know how inadequate such an opportunity must have been for anything except the introduction of leading mains, and the demonstration that light could be supplied from a chamber above a glass ceiling, without offensive shadows on the floor, and without the slightest ground of objection from any of those supposed evils that were then too generally considered to be inseparably attendant on the use of gas. Fifteen years elapsed after that period, however, before I had the opportunity of showing this, or any equivalent arrangement, in operation at the ceiling of the House of Commons, during the sittings of the House, even in the imperfect form that was executed rapidly, and during a very limited period, under the instructions of a committee, though, in 1844, temporary illustrations were given of one variety of lighting from the ceiling.

Without entering further on this point, or even taking up more of the many important questions connected with the progress of improvement in architecture that are not exclusively connected with the Fine Arts, as the communication of heat, the construction of fire-proof buildings, the system of drainage, &c., we trust that enough has been explained to demonstrate that architecture has, at this period, been passing through an important state of transition, and that much still remains to be effected before it can be placed on a right footing.

The mere fact of a member of the medical profession having been called to take an active part in the direction and arrangement of numerous practical questions connected with architecture in public buildings of every variety in England, Scotland, and Ireland, including equally the palaces of her Majesty the Queen, to which he is permitted to refer by the Right Hon. the Earl Delawarr, the Lord Chamberlain, under whom he acted, to the humblest habitations of the people, on which he was requested to report by the government, must carry the conviction that something yet remains to be adjusted to bring into harmony, through the *commune vinculum scientiarum*, he combined results arising from the progress of architecture and sanitary improvement; and if I have been compelled at times to make statements and references to my own labours which I would rather have avoided, it will be recollected by those who have watched the progress of events during the last twenty years, that I have, at least, had a pretty good share of those attacks and difficulties that beset the paths of those who engage in questions of public importance.

I submit the following propositions to your consideration, as a means of facilitating the revision of architecture in its position as a useful art, and of placing the useful and the beautiful in a more harmonious conjunction than they generally present in public buildings and in the habitations of the people:—

1. No portion of any public building ought to be commenced till a more complete series of models or drawings is provided than has hitherto been customary, and a special grant should be given for this purpose, exclusive of all competition premiums.

2. The present mode of remunerating architects often leads to the too precipitate commencement of foundations before any system of warming, ventilation, acoustics, lighting, or drainage is fully considered and determined, and these valuable opportunities are often irreparably lost, or restored only at great expense.

3. An extended system of instruction should be provided for the future student of architecture at all the principal colleges or universities in this country, such as has been partially commenced of late years, and the

curriculum placed on the same footing as to honour and position that is awarded to the members of other learned professions.

4. Acoustics, warming, lighting, ventilation, and drainage should be held as objects of study, equally incumbent on the architect as those which have hitherto been found to constitute the more attractive branches of the profession.

In offering these remarks it is hardly necessary to explain that I should not have ventured to have opened these questions in so brief a communication as this has necessarily been, had it not been with the view of explaining more clearly the course pursued in the ventilation of St. George's Hall, to which I have now to advert.

[Dr. Reid then entered into the history of the construction and arrangement at St. George's Hall, and paid a tribute to the memory of Mr. Elmes, who fell a sacrifice to the great work which has immortalised his name. He then detailed the manner in which his department of the works had been carried on after the decease of the architect, and with the successive co-operation of Mr. Rawlinson, Mr. Weightman, the surveyor to the municipal authorities at Liverpool, and Professor Cockerell, who has been engaged in finishing the building.

Dr. Reid here referred to a number of drawings and diagrams, in continuing the illustrations he gave from St. George's Hall of the views he advocated, but as a general description of these works appeared in the 97th number of this Journal, it is thought unnecessary to repeat it here.]

DISCUSSION.

The Chairman regretted that, owing to the circumstances of the times, it had not been practicable to secure the presidency of a gentleman conversant with the important subject so fully and ably opened up to the Society that evening, by so competent an authority as Dr. Reid. Under these circumstances the Council had requested him (Mr. Winkworth) to take the chair, and in that position it became his duty to invite discussion on the various points treated upon by Dr. Reid. He must, however, request gentlemen to compress their observations as much as they conveniently could, for, if time should permit, Mr. Henderson would read a paper on Life Boats, illustrations of which were now on the table. St. George's Hall, Liverpool, was well known to be a magnificent specimen of what use might be successfully made of the accumulated materials of architectural and historical knowledge, and great credit was due to the architect, the late Mr. Elmes. In it also the appliances of scientific discovery, as regarded ventilation, were successfully introduced by Dr. Reid, who had so lucidly explained the details connected with that beautiful building.

Mr. T. J. Pearsall stated that he had inspected the laboratory in Edinburgh, which had been described by Dr. D. B. Reid, and the plans of which were on the table. It was a peculiar building, possessing many qualifications. He had the great advantage of being in company with an architect (now deceased) who had visited, for scientific investigation, the most celebrated theatres and buildings in Europe; and the result of minute trials of Dr. Reid's laboratory showed that, for the purposes of sound, it was a most wonderful building. The lecturer could be heard in every part, even if the students had, of necessity, to continue their work at different furnaces and tables, and, of course, this was a great advantage in the teaching of practical chemistry. One other point he might name, viz., that Dr. Reid had declared *all air passages* should be so large, and so arranged, as to be easily inspected. He had found, by experience, the evils that resulted from passages and channels for air that were inaccessible. It too often happened that in the summer dust would collect, and even birds, mice, &c., find their way in, and the result of accidental depositions of dust and dirt not only vitiated the air, but the whole plan and apparatus were frequently blamed, by those evils that were unsuspected at the outset, and not obviated in the construction of the passages and building.

Dr. Watts said, his name having been mentioned in connection with one of the large public buildings in London, he would say a word or two upon the subject of acoustics, inasmuch as Exeter Hall was, in his experience, one of the best speaking places he had ever stood in. It was a large place, very plain in its structure, but any man with ordinary powers of voice might be heard to the ful extent of the whole hall without difficulty and without extraordinary exertion. Some 15 years since he was present in the Manchester Town-hall, and at that time it was an oblong building, with two rows of columns cutting off a piece at either end, and it had three glazed domes in the roof—one large dome in the centre, and smaller ones at either end. When he entered the hall a gentleman was, speaking in a loud tone of voice, and he tried every possible place in the hall to hear him, but for full an hour he could not make out a single sentence that fell from the speaker. The only mode in which he could account for this was, that the platform on which the speaker stood was not far removed from the centre dome, and the voice ascended and descended, and was reflected from the walls in all directions, and created such a continual echo as annoyed the audience without the possibility of their being very much edified by what the speaker had to say. The observation of Dr. Reid respecting the necessity of considering the question of acoustics, ventilation, and illumination, prior to the commencement of the building, was, in his (Dr. Watts') opinion, the most important suggestion of the evening; and it would not be a bad theory, whenever a public building was proposed, that the ventilation, the illumination, and the acoustics, should be considered together, and fully agreed upon before the building was commenced; and if that were done there could be no finding of fault when the building was completed. The first public building with which he had any particular acquaintance, was the Mechanics' Institute at Coventry. There they attempted the warming of the building by means of hot water; the pipes were small and the furnace was large, and his experience of that arrangement was, that the atmosphere, though very effectually warmed, was very much vitiated—so much so at times to render it very disagreeable; and another great defect in this system was, that unless the apparatus was kept constantly at work, (and that was an expensive process), when the cold weather came the water froze in the pipes, and when a thaw came or a fire was lighted, they burst. He was also connected with the Manchester Free Library, where a variety of experiments in ventilation were tried. The ventilation was undertaken by Mr. Daniel Stone. The building, it should be stated, existed before the free library was thought of, and it was a conversion into a free library, but much money was spent to obtain efficient ventilation, and he had no doubt Mr. Daniel Stone did his best to effect it by means connected with the illumination. Double pipes were suspended over the burners, the inner ones for conveying away the products of combustion, the outer ones the vitiated air of the room. At the ceiling these were connected with channels leading into the flues. The day of opening came, and like most meetings of interest in Manchester, it was a crowded one, and it grew very warm in a little time, but strict injunctions were previously given that neither door nor window should be opened, and one could readily understand that such injuction was necessary if the mechanism for the ventilation was to be duly tested; but Sir John Potter found, after a time, that although the apartment was said to be ventilated on a new principle, yet they must resort to the old one, and open the windows; and they did so.

Mr. Slaney said it might be thought presumptuous in him to take part in this discussion. He, however, had had the honour of working with his friend, Dr. Reid, for many years, on a Commission of Health, at which time their attention was directed to one of the subjects to which allusion had been made in the paper of the evening. With respect to the dwellings of the public generally, and of the poorer classes in particular, he thought it was of great consequence that ventilation should be thoroughly carried out in them. A simple mode, by which, at a cheap rate, and without difficulty, they might be able to ventilate the humble chambers of the poor, was a subject that appeared to him of the highest consequence; and, without referring to any new plans, he would say there had been simple methods brought forward which had been of great use in that way. In the first place, they had the plan of Dr. Arnott, of a valve placed in the chimney. This was done at a cheap rate, and in a simple form, and although, perhaps, not uniformly successful, yet in a great many cases it had proved quite successful, as he (Mr. Slaney) had proved. In the second place, another simple mode of ventilating the chambers of the poor—their bedrooms—was by the introduction of a zinc pane in the window, perforated with small holes, which was found to maintain a state of atmosphere essential to health. These things, although humble, were of the first importance to the poorer classes. He would not advert to them further, because they were familiar to most present, but these were matters which a little information might tend to carry out still further, and the plans to which he had alluded might especially be usefully employed in school-rooms, and rooms of smaller dimensions, although they might not be adapted for the larger class of buildings, such as those to which their attention had been principally directed that evening. The hint was given at St. Martin's Hall, during the Educational Exhibition which was held there under the auspices of this Society, that a simple and ready means of ventilation was required for school-rooms in which a great many persons assembled. Dr. Arnott offered some valuable suggestions on the subject, but a gentleman from the other side of the Atlantic—the Hon. H. Barnard—gave them an interesting detail of a plan which had been adopted with great success in the school-rooms of America. The plan was stated to be this:—In the first place they had in the centre of the room a chimney, which carried off the combustion from the stove, and around that a second chimney was built. The inner chimney heated the air of the outer chimney, and the pipe was tapped at the upper part of the room, to enable the heated and vitiated air to go into the outer chimney, and it was carried out into the open air, so as to rid the school-room entirely of the vitiated air. The gentleman stated they had found that to be a cheap, and at the same time a very efficient mode of ventilating a large room like a school-room, in which there were many people assembled, and as such he (Mr. Slaney) had brought it before the notice of the meeting.

Mr. Varley said, nine years ago the medal of the Society was offered as a premium for the best mode of ventilation without complicated apparatus, and that medal was awarded to Mrs. Varley. The plan consisted of a perforated zinc tube, connected with the external air, and passed round three sides of the room, at the cornice; the fourth side had a corresponding perforated tube on the cornice, with its exit into the chimney. This was employed to carry off the vitiated-air by means of the ascending current in the chimney. This plan had been successfully adopted in a school-room in Baldwin's-gardens, Holborn, where upwards of 200 children daily assembled; and he thought, from all the circumstances, that was as severe a test as the plan was capable of undergoing. On the subject of acoustics he (Mr. Varley) referred to Drury-lane Theatre, and also the theatre of the Royal Institution, as buildings the most perfect in their acoustic arrangements of any that he was acquainted with, the latter being, in his opinion, well worthy of the consideration of those who were charged with the construction of similar buildings.

Mr. R. W. Billings could not entirely agree with the divided duties which Dr. Reid advocated. Dr. Reid had described his current towers, with covered louvres, and other modes, so as to break the currents of air. He (Mr. Billings) had tried that several times, and, singular to say, he had failed; he had succeeded in some cases, but he failed entirely in one instance, in Forfarshire. He had his flues collected together, in what appeared to be an old turret, in Forfar Castle, and it was a bitter place for a trial, because there were two winds that baffled all his attempts. The turret was louvred in, and his vents came in on the floor. The plan having failed, he removed the louvres, when perfect results were obtained. He had seen a great deal of Dr. Reid's experiments at Edinburgh; his laboratory was certainly a very wonderful thing. The doctor had spoken, amongst other things, of a simple way of getting rid of echo. There was a concert-room in Edinburgh, built by Lord Murray, where the echo was found to be very unpleasant, but that was entirely cured by the hanging of a piece of drapery between two of the columns, and there was no longer any unpleasant effect. One serious objection which Dr. Reid made to architecture as it now stood was, that the ventilation was not settled with the plans for the building. For his own part he (Mr. Billings) should take great shame to himself if he did not consider that ventilation formed a very essential part of the plan in the first instance. It was a matter as much to be studied as the landscape of architecture. A man who built a house without harmony with the surrounding landscape did not understand his profession, and so with regard to ventilation, he should not consider a man understood his profession who could build without due regard to ventilation. Upon the subject of taking the flues into towers he might state that he was building a small church in Cumberland, the whole ventilation of which was carried off at the top of the spire, the air being brought in at the east end, the warming apparatus being placed in the middle of the structure. He had also designed a new garrison church for Edinburgh, and in that he proposed to use the same ventilating apparatus—viz., a tower and air shaft—but all through that building, both at the base of the windows and against the roof, there would be the means of increasing or decreasing the admission or expulsion of air, by means of louvres. The windows for the exit of the foul air were entirely concealed in the heavy matriculation of the work; there would be the power, by means of a screw, of opening the windows, and modifying the supply of air at pleasure. Another building, which he had also designed, was the garrison hospital, in which he proposed to adopt a plan for admitting the fresh air under the beds of the patients. Whilst entering into these matters they must take care that, whilst endeavouring to improve architecture, they did not too much interfere with matters of design. The *elegant* top of the Old Bailey was an instance of this. He did not know whether his friend, Dr. Reid, had had anything to do with it, but that might fairly be denominated a monstrosity which had humbug stamped upon the face of it; and he would recommend any one who had a desire to study the beautiful in architecture to go and look at that cowl at the top of the Old Bailey.

Mr. John W. Papworth, F.R.I.B.A., when, some time since, in the centre of the middle-box of Drury-lane Theatre, found the sound strike in two distinct waves, one on each ear, and confuse the sense of sound; but a slight alteration of position obviated the defect—so, in some cases, it was clear that inconvenient places for auditors might be found in the rooms best adapted for hearing. He asked if Dr. Watts did not think that Exeter Hall had been improved by the little alteration of the ceiling by the architect, Mr. Daukes.

Dr. Watts's experience had only reference to the Hall since the new ceiling was erected.

Mr. Papworth continued. As regarded the question of improvement of *building* (not *architecture*), the science had never perhaps completely met the wants of society, perhaps it never would fulfil them; and the art of architecture had been always in a state of transition. He agreed with Mr.

Billings that no architect who professed to follow his vocation conscientiously could ignore his duty to keep pace as much as possible with the demands of advancing knowledge as to light, heat, fresh air, and acoustics. With regard to acoustics, he might mention that Sir David Brewster himself was modest enough to decline speaking with authority; perhaps nothing of high importance had been added since Brewster's published works, unless Mr. Scott Russell's is-acoustic curve were included. He could imagine that Dr. Reid had experienced cases in which the before-mentioned four points had been, apparently to Dr. Reid, not studied, or at all events not studied with reference to the results of that gentleman's experience, but Mr. Papworth hoped that such cases would be found, as usual, exceptions, proving a general rule of professional attention to such really vital objects. He would refer those who could obtain permission to see it, to Osmaston House, (designed by Mr. J. Stevens, of Derby), as an instance of professional skill, as far as it was unobstructed, in sanitary matters. He could assure Dr. Reid that no reasonable system of sanitary *construction*, was beyond the reach of artistic *decoration*, the difficulty that really existed was the expense apparently entailed. Mr. Papworth did not know in what manner the present objectionable system of professional remuneration for architects, led to a hasty commencement of the works; his own designs were rarely finished before the working drawings were prepared—any other course led to embarrassment. He would say that if competition were good for the decorative portion, he thought it equally good for the scientific part of a design, and believed that there should be one or more separate competitions for the light, heat, ventilation, and acoustic arrangements of a building; and that the artist should not be consulted until those points were determined, It was simply the fault of the public if it were not well served by professional men on those points. He would remind the meeting that large public works did not occur much more frequently than once in a quarter of a century, and that more than one now rarely fell to the lot of a single architect; secondary buildings, such as a church to hold 2000 or 3000 persons, which were quite as important as a Parliament-house, were now submitted to unrestricted competition, so that while the older architects reasonably refused to put their accumulated practical knowledge into the lists gratuitously, the public was caught by the attractive designs in handsome frames, (this was not the case on the continent) of young men who could not possibly be considered, at 25 or 30 years of age, as masters in science and art. He did not refer to the case of the lamented Elmes, who, like two or three more, was educated from infancy, and who had served, it might be said, a double apprenticeship before beginning to distinguish himself in the great public work which was his monument. The public also presented obstacles, at present almost insuperable to the success of Dr. Reid's most moderate views. That gentleman had demanded the use of low ceilings; the new Boards of Health were not unlikely to insist upon high rooms; and the public would at once condemn any builder who invited them to enter rooms of dimensions magnificent in every respect but height. Mr. Papworth might almost call himself a pupil, having studied the steps, of Dr. Reid; and having adopted the results to the fullest extent that he could, it might not be uninteresting to mention some of the difficulties which beset a practical man. In some model stables, he had been vexed, when showing them to a friend, by seeing the apertures fastened up because the groom had seen nothing of the sort used elsewhere, and was not going to be bothered. He had built a dining room with means for ventilation which acted with little manual attention, but he had been told by his client, that the room which was too warm, was allowed to be uncomfortable, because it was too much trouble for a servant to look to a single sash-weight. He had not since adopted any system requiring attention, but having erected a public ball room, and put the best self-acting means of ventilation in his power, he had found the fresh-air apertures in the sides of the room, to be stopped up by the upholsterer. In a pair of second-class houses, the systematic mode of ventilation had been partly impeded, the chimneys consequently smoked, and the effect of his studied design had been completely spoilt by the introduction of zinc tall-boys instead of the ornamental chimney tops. Indeed, when he spoke to any owner of one of the 500,000 houses in London and its surburbs, as to the propriety of expending money upon putting the dwelling into a really sanatory condition, he constantly felt himself open to the suspicion of being "a quack in want of a remunerative case." He would add, in conclusion, that having long agitated the question of diplomas after examination in his profession, it was competent for him to observe, with reference to the object of Dr. Reid's paper, that it was still more necessary to teach *educated* people the sanatory necessities of a house such as a wise man should inhabit, for, in fact, more care was spent upon animals of luxury at the present time than upon reasonable beings, even by those persons who would be affronted if told that they were themselves actually slowly dying in unhealthy mansions.

Mr. Billings begged to say one word further—he said, let there be competition, but let all the competitors be paid.

Dr. Reid would detain the meeting but a very few minutes in replying to some of the remarks which had fallen in the course of this discussion. In the first place, he hastened to clear himself, from what he should very much regret, if any one should suppose that he wished for a moment to cast any stigma on a profession. His object was—not to blame architects or the system of architecture, because he did not think that was more open to attack than the practice of any other profession; but what he maintained was, that every profession was capable of progression, and that where one profession could aid in the improvement of another, it was their duty to aid in any movement that would advance the general progress of art. With respect to the points that had been placed before the meeting by some of the gentlemen who had spoken, he was one of the last who would wish to keep up that system of closeting to which some of the speakers had adverted. Why had he had anything to do with ventilation at all? It was not his first profession: he was engaged in another field; but if it be the fact that many works had been executed which had stood a satisfactory test for various periods, from ten to twenty years, they were, perhaps, not unworthy of attention. The old Houses of Commons had stood the test of fifteen years' experience. He did not allude to the new houses, not because he was unwilling to do so, but because only half the evidence on the real questions at issue there was as yet before the public. He did not think it wrong to say that architecture might assume a new position in regard to ventilation, when in London, in Manchester, in Liverpool, in Paris, in St. Petersburgh, and in most other places he had known, systematic ventilation, with the perfection of which it is now susceptible, was only recently taken up in detail. Architects were not to be blamed for the state of ventilation in previous times more than medical men; nay, rather less. But why should blame be cast on any one? The progress of discovery in modern times had opened up fields of investigation previously unknown, both to architects and medical men. But were they all agreed that architects had embraced that field sufficiently, or had medical men been enabled to effect all they desired as pioneers in this department. They were in a state of transition on the point. What is the best method of meeting that transition? That was the practical point which he wished to bring forward in this paper. Well then, if that be the true position of the case, what was more important than a system of architecture and of study that should define this, and could be brought to bear upon the whole subject? He said, also, they might design a totally new series of arrangements without in any way affirming that the old arrangements were not capable of being applied, and then they would develope a system of architecture which was not yet before the public, and lead to the highest perfection of acoustics. They might then build rooms that would be to the voice what the violin was to the string, and then they would get a power which it was impossible to obtain by other means. With regard to Exeter-hall, he believed he had delivered twenty lectures there, besides taking a part in other proceedings in it, and he knew that under the old *régime*, it required in a crowded audience an amount of breath for one syllable, which ought to have sufficed for a whole sentence. He had no doubt it was improved since then, and the effect of echo might be cured by the proper application of drapery. None of this was opposed to what he had said, but the point was to reduce the whole to greater certainty in actual practice. If Exeter-hall had the best system of acoustics previously, why did they alter the ceiling? He would say this with respect to architecture, there was no profession in which there was more scope for learning and inquiry, and why should it not have all the advantages that academic powers and systems could produce? Again, with regard to the allusions made to the Old Bailey, he would tell them the brief history of that transaction. The ventilation of those courts was designed by him in the same year as that of the building to which he had chiefly directed their attention this evening (St. George's Hall). In the case of the Old Bailey, a specific sum was voted for the works, and he was to interfere with nothing that was visible in the interior of the courts; he was not to go beyond the grant made; and, moreover, he was not to take more than five weeks for the completion of the work. Unless, therefore, Mr. Billings was prepared to say that the discharge adverted to did not let out the air, he (Dr. Reid) did not know what more he had to be answerable for. As to very low ceilings, they are still more objectionable than too high ceilings. The right proportion is the best, but, in general, excessive altitude is equally injurious to the design and to the ventilation. Allusion had been made to some points connected with the dwellings of the poor. Mr. Slaney had referred to it, than whom no one, from the interest he had always taken in the matter, was more entitled to speak upon it; but nothing which that gentleman had stated was inconsistent with the views which he (Dr. Reid) had advanced. He was not dealing with the dwellings of the poor in this communication, although in another sense it affected the well-being of that class, for this great public building (St. George's Hall) would be open at times for their entertainment and their instruction. They would visit it in families, and being acquainted, by that means, with the benefits of a perfect system of ventilation, they would naturally be led to inquire how those appliances could be made available to the promotion of their own domestic and social comfort and welfare. With respect to the poor man's dwelling, there was one thing which he required to know, above all others, to make his dwelling comfortable, and that was how to make a diffusive atmosphere, and to supply his fire-place without offensive cold in winter, and if the arrangements for ventilation were made with a diffusive surface, having twenty times the present area, then, instead of hissing serpent-like currents, the evils of which they now complained so much would no longer be in existence. Give a large diffusion of air, and free ingress and egress, with control over it at the proper points, and then they would get over the great practical difficulty without any costly arrangement. He was much obliged to the gentlemen who had taken part in the discussion for the observations they had made, and he trusted they would conduce to bring the subject to a practical bearing, and to advance the general progress of science.

The CHAIRMAN proposed that the thanks of the Society be given to Dr. Reid for his valuable and highly interesting paper, which was accorded by acclamation.

MR. ANDREW HENDERSON called attention to a series of models of life-boats, and regretted that, owing to the lateness of the hour, his paper "On the Past and Present Position of Life-boats" could not be read. He, however, still hoped to have an opportunity of bringing the subject before the Society at one of the ordinary meetings; but, failing that, his paper would be printed in the *Journal*.

The Secretary announced that the paper to be read at the meeting of Wednesday next the 25th inst., was "On Public Works for India, especially with Reference to Irrigation and Communications," by Lieut-Col. Cotton.

Home Correspondence.

MR. P. L. SIMMONDS ON COLONIAL CONTRIBUTIONS TO THE PARIS EXHIBITION.

SIR,—A few months ago I furnished an outline of some few of the contributions coming forward from India and our colonies for the Industrial Exposition to be opened at Paris next month. I am now enabled to supply some additional information, which I think will prove of interest to very many of the members of the Society of Arts.

I am, sir,
Your obedient servant,
P. L. SIMMONDS.

5, Barge-yard, City, April 12, 1855.

CANADA.

The Canadian Industrial Exhibition at Montreal was inaugurated by the new Governor-general on the 6th March. Sir Edmund Head, after returning thanks for an address presented to him, remarked that these exhibitions form a new epoch in the history of the world. Their effect is to encourage commerce in an eminent degree, by bringing the people of different nations together, and the effect of commerce on the different nations is to promote peace. They are the true peace societies. The appeal is made directly to the selfishness or interests of mankind, it is true, but the object is gained. These Exhibitions are a result of free trade, and they are in themselves a sort of free trade of intellect. Such things would not have been thought of in former times under the pernicious shade of protective policy. Then one people, or individual, would have been afraid to publish discoveries or ideas, lest they should be copied or borrowed by others. It is recognised now that a great truth lies hidden in the doctrine of competition, and that honourable rivalry tends to the advantage of all. Such exhibitions, I believe, are eminently calculated to promote progress, and this country may reasonably expect much from them.

People in Europe have been apt to suppose that Canada produces little else but corn, timber, and minerals, but the fine collection brought together proved that the province was also able to vie with older countries in machinery, manufactures, and mechanical productions. The implements and machinery used for agricultural purposes, and those tending to economise labour, especially as applied to the great staple production of the colony, lumber, were exceedingly good. A good deal of interest attached to Mr. Romain's steam plough, which is designed to take the place of the plough to a certain extent, where the land has already been cultivated, and is free from stones and stumps. It stands about seven feet high, and is six feet broad by twelve feet long, exclusive of the waggon pole to attach horses to. It would appear at first sight incongruous to have horses and steam combined, but practice has shown that the machine cannot be wholly locomotive, and the horses are indispensable to move it from the barn or engine house to the field, and on very undulatory ground to help to turn it at the end of the furrow. Horses would not in all cases be required for this last evolution; indeed, it is expected eventually to dispense with the horses after the machine reaches the field. While ploughing, this machine will also perform the part of a harrow, levelling the soil and forming a furrow; and to complete the operation of cultivation it is also intended that it shall deposit the seed in the ground. Taking a view from behind the machine we find a strong boiler-plate framework, in the centre of which is placed the boiler. On each side are placed two large wheels, five feet in diameter, with a tyre of fifteen inches broad to stop the wheels from sinking in soft ground; behind the wheels is a transverse shaft, carrying pinions, which gear into the large wheels. These pinions are thrown into gear or out, propelling one or both wheels at pleasure. Behind this shaft is the digging cylinder, made of boiler-plates. Four inches from the periphery of this cylinder is rivetted and bolted a series of spiral knives, which act in succession, and throw the earth up behind it and against the seed box or partition in a fine pulverised state, the onward progress of the machine filling up the trench formed by the knives; behind the leveller is a small wooden roller, which presses on the soil—this is all in the centre of the frame. On the outside of the frame there are two small engines, set at right angles to each other, and attached to two upright shafts by two connecting rods working horizontally, and driving each end of the cutting cylinder with bevil gearing. The whole work is a masterpiece of mechanical engineering. It is principally made of wrought iron, exquisitely finished; the bushes, bearings, and journals are case-hardened, to prevent their cutting, as the machine will necessarily have to be worked in places where a good deal of sand and dust will be flying about. The cylinders are covered with black walnut, and hooped with copper. The framework is firmly stayed together with tubular stays. The boiler is new, and was brought out at first solely for steam cultivation, but can be adapted for ordinary purposes, although not fully tested. Competent engineers pronounce the boiler admirably adapted for the object in view. It is cuniform, or wedge-shaged. The tubes contain the water, and are so disposed as to baffle the heat in making its exit to the smoke-box and funnel. It has every precaution for safety that a railroad locomotive has—glass water guage and cocks, pressure guage, and two safety valves.

The collection of mineralogical and geological specimens furnished by Mr. Logan, and others, was exceedingly rich, embracing magnetic, specular, bog, and other iron ores, zinc, lead, copper, nickel, and native silver and gold, mineral paints and manures, materials applicable for jewellery, and common and decorative architecture.

Some fine blocks of lithographic stone from Marmora, prepared with *fac-simile* autograph signatures of the French and English governors of Canada, from the "Album de Souvenirs Canadiens," of Lieut. Colonel Jacques Viger, first mayor of Montreal, are of interest.

AEROLITE.—A mass of metallic iron, of extra terrestrial origin, found in Madoc, C.W., weighs 370 lbs., and is alloyed with 6.35 pieces of nickel. This is the seventy-fifth mass of meteoric iron known, and the first one found in Canada; only one larger is preserved in any collection. The whole number of aerolites described, including those of stone as well as iron, is 338, and there are only ten of them heavier than this.

Canada will be well represented at the Great Congress of Industry, and sufficient will be shown to prove that the country abounds in mineral wealth, in most useful fossils, in timber of the most valuable description, and likewise in mechanical skill of a high order, which, together with the different kinds of grain that will be exposed, and which even in England bore off the palm, cannot fail to attract the attention of the mercantile world at Paris. The number of exhibitors whose produce has found a place was upwards of 300.

NEW SOUTH WALES.

The Commissioners have received nine nuggets of gold in quartz, as a presentation from the Great Nugget Vein Company. Each specimen contains a large proportion of pure gold, and the whole collection, which presents a very beautiful and imposing appearance, weighs about 16 lbs. There are also many other interesting nuggets, obtained from Ophir, Braidwood, and various other diggings in the colony. Some of these specimens are remarkable for the crystaline form of the gold as well as that of the quartz with which it is associated. Among them there is one weighing 16 ozs. of nearly pure gold. To the French perhaps one of the most interesting and unique contributions will be the stump of a tree, bearing an inscription, cut by the party of the celebrated La Perouse, on the occasion of his memorable visit to this island. Through the courtesy of Mr. Commissioner Pearce permission has been obtained to remove the stump from its original position at Botany Bay. To some extent this may be considered as a loss to the colony; but, considering that the stump is a memento which, from its perishable nature, cannot last long, this is, perhaps, the most appropriate way in which it could be disposed of. It will be gratifying to the French to find that a monument so frail has been preserved with almost sacred regard through so many years, out of respect for the intelligence and enterprise of a member of their own nation. A fine sample of manna has been contributed by Mrs. Hay, of Wolaregang, Murray River, New South Wales. It is a white substance, exceedingly sweet and agreeable to the taste. It exudes and drops from the bark of the eucalyptus tree, and is one of the principal sources of subsistence to a large number of birds, squirrels, insects, &c. Among the most useful and practical contributions is a large sample of maize in the cob, commonly called white or bread corn. It differs materially from the ordinary maize, in consequence of its having a peculiar whiteness and fineness of grain, which give it an appearance and taste when ground not unlike those of wheat flour. Although this species of Indian corn is not extensively grown in the colony, we are credibly informed that it yields a much larger proportion of grain than the common Indian corn; that it keeps much longer; and that it is in every respect more profitable. When ground, we are informed that it will yield about 50 lbs. per bushel of fine, soft, white flour, which, when mixed in equal proportion with wheat flour, makes excellent bread. Mr. W. Macarthur has just returned from a tour in the Illawarra district with a valuable addition to the large and beautiful collection of native woods which he has already presented for the purpose of exhibition. Mr. Moore, the active and intelligent Director of the Botanic Gardens, has also submitted some interesting varieties, collected during his late trip to the Moreton Bay and Wide Bay districts. These latter have all been sawn into lengths, planed, and arranged in the Museum. Some magnificent specimens of copper ore in large blocks have been courteously contributed by the directors of the Bula-Bula copper-mine. Some of the blocks weigh from 30 to 40 lbs., and are particularly rich in copper. Some fine large samples of lead ore have also been contributed by Mr. Grosvenor, of Yass. The ore was obtained from a place called Jobbins, about five miles from Yass; it has a very rich and beautiful appearance.

ARROWROOT, which is the pith or starch of the root *Maranta arundinacea*, and received its common name from its being supposed to be an antidote to the poisonous arrows of the Indians, is represented in this Exhibition by two or three very creditable specimens. The cultivation of arrowroot, although apparently quite successful in this colony, has not yet obtained for it any demand either as an article of commerce or even of colonial use, beyond a very limited extent. The arrowroot sold in Sydney is mostly that of the West Indies, which is generally admitted to be the finest quality in the British market, and to be much superior to that obtained from the South Sea Islands. The amount of labour required for producing the arrowroot to the state in which it is used for food, will probably, for some time at least, deter the growers from attempting to compete in its production with other countries, even if the article could command an equal commercial reputation.

One of the samples of arrowroot is exhibited by G. F. Leslie, Esq., having been grown in the garden of Captain Wickham, the Government Resident at Moreton Bay. A second sample is presented by T. Childe, Esq., also from Moreton Bay. Two other samples, both from the above districts, were exhibited severally by T. S. Warry, North Brisbane, and by Ambrose Eldridge, Esq., from the Stockton and Hunton Chemical Works, prepared by Mr. J. E. Blake.

Chemical Preparations.—Sulphuric acid is made by the same process as in England, in large leaden chambers. The sulphur is from New Zealand, and is very pure, containing 95 per cent. sulphur, a very slight trace of selenium, and no arsenic. It possesses an advantage over that by English makers in this respect, that most of the acids, being made by pyrites, contain arsenic. The specific gravity is 1·750 to 1·800. The price at which it can be sold is about 3d. per lb.; but should a large demand arise for stearine candle-making, the working of platinum, silver, or the purer gold ores, it might be manufactured for considerably less; and I am not without hope that a demand of this nature may shortly spring up.

Nitric acid. If this acid should be required, it could be made in any quantity. It would be useful in fumigating hospitals, or in case the colony were visited by cholera or fever.

Muriatic acid, like nitric acid, could be made in considerable quantities, the only drawback being the high price of common salt.

Products of the decomposition of coal tar. 1. Naptha.—So far as has yet been ascertained, the produce of naphtha from colonial coal tar is much less than from the English coal tar, and the quantity of tar obtainable in the colony being small, the manufacture is necessarily limited. 2. Heavy oil, or dead oil, or pickling oil. The first two names are given on account of the great specific gravity of this product, as it sinks in water. Its chief use is in pickling or preserving timber against the effects of salt or of fresh water, cobra, &c. It is in very general use in the East Indies, for pickling piles in forming wharves, and might be most advantageously employed in our waters. To use it properly the timber should be placed in a reservoir from which the air is exhausted, so that the oil, when admitted, finds its ways into the pores of the wood. 3. Railway grease. This is a yellow oil or grease, solid at ordinary temperatures. It is particularly adapted for lubricating the wheels of railway carriages, trucks or tramways, &c., on account of the ease with which it melts, should friction cause any heating of the axle. Mr. Blake states that he can obtain this in considerable quantities. The sample shown is not completely prepared "railway grease," but it contains the substance from which this article is prepared. 4. Pitch. The sample shown is rather small, and was made with the intention of being converted into asphalt, or patent fuel, but at present it could not be obtained in sufficient quantity to make either of these an article of commerce. These are all the products hitherto obtained from coal tar, although the chemical results of the decomposition of this substance are very numerous indeed.

Deodoriser. This is a neutral sulphate of zinc, possessing all the properties of Sir William Burnett's disinfecting fluid. In contact with decomposing animal matter, the acid takes the ammoniacal emanations, while the zinc precipitates the sulphuretted hydrogen, carburetted hydrogen, &c. It is concentrated in the highest possible degree, and in use should be mixed with from ten to fifty times its bulk in water. It can be sold at one-half the Sydney price of Sir W. Burnett's manufacture, and in this warm climate, where the drainage of our hastily built cities has not been attended to, would prove invaluable in counteracting the baneful effects of the exposure of feculent matter. Sulphate of zinc may be crystallised, and can be obtained in a shape admitting of safe and easy carriage.

Marine Products.—Some specimens of sponge obtained from the Heads of Port Jackson, are exhibited by Mr. Hordern. This substance which was formerly supposed to be a vegetable production, but has since been classed amongst the zoophytes, does not seem to have been found in any quantity—a circumstance, perhaps, rather to be attributed to the difficult and hazardous process by which it must be procured, than to any absence of the article along our coasts. The specimens are of small size, and not of very fine quality. The exhibitor has also sent an interesting specimen of marine moss, also gathered at the Heads of Port Jackson.

CAPE COLONY.

The show of articles illustrative of the resources of this colony, collected by the Committee for the Paris Exhibition, closed on the 5th January.

Though very far from what it might have been, had the interior and frontier districts come forward more freely with their produce, the show was, on the whole, extremely creditable to the Cape, most of the established staple articles of produce being well represented, while the specimens of copper ore from the Namaqualand mines are so rich, beautiful, and abundant, that they cannot fail to attract the attention of the manufacturing and mercantile men who, from all parts of the world, will assemble at the Imperial Exhibition.

The following were awarded prizes:—

Wool.—Clothing quality; prizes adjudged to Messrs. M. and H. Breda, of Zoetendals Valley. Combing quality; to D. G. Breda, of Ratels River. Average quality; to T. B. Bayley, of the Oaks, Caledon.

Minerals.—The prize for the finest specimen of copper was adjudged to one of two large masses of ore, weighing 300 lbs. each, from the mines of Messrs. Phillips and King, at Springbok and Spectacle. A beautiful specimen of ore from the mine of Mr. J. O. Smith, No. 2, was also adjudged worthy of transmission.

Tallow-Candles and Berry Wax-Candles.—Prizes awarded to Mr. James Mossop.

Colonial Woods.—To Dr. Pappe and Mr. Zeyher, for a collection of specimens, and a box inlaid with different kinds of Cape wood, finely polished.

Curiosities.—To Mr. C. Bridges, for lion and tiger-skins. To Mrs. A. J. van Breda, for feather-tippet, composed of feathers of Cape birds.

Grasses.—To Mr. T. B. Bayley, for a collection of grain and grasses, from Caledon.

Tortoiseshell.—To Mr. James Harden, for three superior specimens.

Silk.—To Mr. G. Baker, of Picketberg, for various specimens of reeled and floss.

Cotton.—To Mr. A. Faure, for a beautiful sample grown at Stellenbosch.

Tallow, Soap, and Bees' Wax.—To Mr. James Smithers.

Flour.—To Mr. H. A. O. Truter.

Mealies (Maize).—To Mr. J. C. Gie.

Cape Preserves.—To Mr. Volsteedt.

Hides and Goat Skins.—To H. Hess and Co., Port Elizabeth.

Horns.—To Mr. Bridges.

Salted and Preserved Meats.—Pork, to W. Martin; beef, to P. L. Morkel.

Biltong.—To Mr. Nicholson.

Preserved Meats.—To Mr. Daster.

Medicinal Plants.—To Messrs. Scheuble and Co.

Gum.—To Mr. H. B. Christian.

INDIA.

The Punjab contribution to the Paris Exhibition was exposed to public view in Calcutta, and attracted an immense crowd of visitors. The collection consisted almost entirely of the silk and shawl manufactures of the Punjab, and comprised almost every species of the valuable cloths manufactured in the far North-West, from the plain woollen chudder to the famous Cashmere shawl. The *Englishman*, from which I quote, thus notices the contribution:—"The silks from Umritsur, Mooltan, &c., appear to be of a very superior quality to what we remember having seen before, and the contrast of quality between what was sent in 1851 is very striking. The collection of armour is well worth seeing, and shows how very much superior the workmen of the Punjab are to their brethren in Lower Bengal. The assortment of valuable jewellery, comprising almost every sort of ornament worn by rich natives, will show not only the taste of the people, but also the foolish manner in which Bengalees spend their money. We observed in a glass case some very valuable gold articles mounted in precious stones; a golden cup, decorated with rubies, diamonds, and other precious stones, attracted our particular attention. These have been presented to the Governor-General by the King of Ava. In workmanship they very much resemble the China silver work, though the execution is much inferior, indeed almost rough. A pair of ivory chairs, made at Berhampore under the supervision of Capt. Layard, are very handsome, but the velvet covering does not seem in keeping with the exquisite carving. It ought, at all events, to have been embroidered either in gold or silver. The ivory mat from Sylhet is an admirable one, and will give people at home some notion of what the natives of this country can do. The Kincabs and Brocades from Benares are, as usual, very rich, and will attract notice. This was the most valuable of all the shows, and at a rough calculation it cannot cost less than three lakhs of Rupees. The Committee appear to have set to work in good earnest, and they certainly deserve the thanks of Government for the splendid collection they have been able to forward to Paris, a collection three times as extensive as that sent to London in 1851, and valued, we believe, at between six and seven lakhs of rupees," £60,000 to £70,000.

A very extensive list of desiderata and prizes offered at the Madras Exhibition is given in the local papers of that presidency, of which I append a summary, which may furnish many hints to explorers, and considerations for investigation. It will be observed that prominence is given to those substances of a fibrous nature, the demand for which has become so great in consequence of the stoppage of the supply from Russia. As this kind of produce will always command a ready market, its importance cannot be overrated. Particular attention is also called to the "best series of raw materials suited for the manufacture of paper." This is also a subject of great importance, the price of paper having risen very much in conssquence of the scarcity of rags. Some short time since I saw a statement in the *China Mail* having reference to this subject, stating that the paper on which that journal was printed was manufactured from the fibre of the bamboo by the Chinese; its quality was excellent, being firm and of good colour. The sub-committee suggests that twenty prizes should be available in the vegetable department, ten in the animal, and fifteen in the mineral: these prizes to consist of pecuniary rewards, prize medals, or honorary certificates. The premiums offered are in the

VEGETABLE KINGDOM.

1. For the best specimen of shell-lac.

Specimens of the lac-bearing branches with the insect, would be interesting; information concerning the mode of collecting and uses of the lac will be thankfully acknowledged.

2. For the best sample of gum elastic, possessing properties similar to caoutchouc or gutta percha, *bona fide* the produce of S. Hindoostan; or for the best sample of any new vegetable production of this kind, which might be advantageously introduced into commerce.

The kuttemundoo gum of Vizagapatam, for introducing which W. Elliott, Esq., received a prize medal, was considered a valuable addition to the India rubber series. It merits a careful examination. Messrs. Healy and Luttrell have shipped a considerable quantity since the favourable report of the Exhibition jurors.

3. For the best series of Indian gums, *i.e.* natural exudations of indigenous trees, containing more or less mucilage.

4. For the best specimen of any fragrant gum-resin, as elimi, anime, myrrh, with information as to the tree producing it, and the quantity procurable.

5. For the best sample of gamboge prepared in homogeneous masses, or run into bamboo moulds, and free of woody fibre or other impurities.

The Coorg and Malabar gamboge being identical with that of Siam, it is desirable to extend the trade by careful preparation of the article.

6. For the best specimens illustrating a starch series, or failing this, any new or superior species of starch.

7. For the best oil series, of which there are a very great number in India.

8. For a good specimen of any new oil, or a series of volatile oils.

9. For the greatest number of vegetable dye-stuffs.

10. For any new colouring materials or dyestuffs.

11. For the best collection of materials which from time to time have been introduced for the use of tanners.

12. For any new or important tanning material.

13. For the best and most instructive collection of cottons, showing the peculiarity of fibre.

14. For the best sample of country cotton (gossypium indicum).

15. For the best sample of Georgian cotton (gossypium barbadense).

16. For the best sample of Peruvian cotton (gossypium accuminatum).

17. For the best sample of flax (linum usitatissimum).

18. For the best sample of hemp (cannabis sative).

19. For the best collection of miscellaneous fibres, as jute, sunn, plantain fibre, yercum-nar, marool, &c.

As the demand for fibres is now so great, it is most desirable that some of the little known fibrous substances should be carefully treated, in the hope of their proving excellent substitutes for the common materials, and thus developing new branches of industry.

20. For the best series of raw materials suited for the manufacture of paper.

As rags have become so scarce in England as to enhance their price, any careful experiments as to the use of other raw materials will be received with approbation.

21. For the most complete and well-arranged collection of timber and fancy woods.

22. For the best samples of tobacco (Lunka and Trichinopoly sheroots, &c.)

VEGETABLE SUBSTANCES USED AS FOOD, &C.

23. For the best samples of E. I. Coffee.

24. For the best series of cerealia, including millets and other small grains used as food.

25. For the best series of pulses and cattle food.

26. For the best sample of refined sugar.

27. For the best sample of raw sugar.

28. For the best collection of spices produced in the Madras Presidency, (cinnamon, cassia, nutmegs, pepper, ginger, &c.) or for any new condiment of a superior description deserving encouragement.

ANIMAL KINGDOM.

29. For the best samples of wool bonâ fide the produce of the Presidency.

30. For the best samples of silk the produce of the Presidency.

31. For the best sample of tussa silk.

32. For the best illustrative series of horns and antlers.

33. For the best sample of mother-of-pearl and tortoise shell.

34. For the best sample of cameo-shells and corals.

35. For the best isinglass prepared in the Peninsula.

36. For the best fish oil.

37. For the best samples of mylabris cichorei.
38. For the most comprehensive collection of feathers and down.
39. For the best skins, tanned and curried for exportation.

MINERAL KINGDOM.

1. For the best series of iron and wootz-steel ores, in its different stages of preparation.
2. For the best samples of native plumbago and antimony.
3. For any other metallic ore, holding the promise of being marketable.
4. For the best chrome ore.
5. For the best sample of alloys, brasses, bell-metals, type-metal.
6. For a good sample of coal.
7. For the best sample of carbonate of soda prepared from dhobies earth.
8. For the best sample of saltpetre.
9. For the best samples of native salt.
10. For the best samples or series of native soaps.
11. For the best materials for making glass.
12. Materials for pottery.
13. Granite, laterite, and building-materials.
14. Emery and corundums.
15. Oil-stones, hone-stones, soap-stones, and lac grind-stones.

THE SLAG OF SMELTING FURNACES.

Sir,—It may be interesting to some of our members who have joined the Society since 1848, to be informed that a paper entitled "Pyrolite or Artificial Lava," dated the 17th of April of that year, was read at one of the Wednesday evening meetings, and was afterwards printed in the Transactions. In that paper I shadowed out, suggestively, many of the useful applications of slag, of which the practicability has now been shown by Dr. W. H. Smith, of Philadelphia, in the valuable paper read before the Society on Wednesday last.

The Society's Prize List for 1848, contained a notice of a Premium of 50 guineas offered "for the best series of experimental researches on, and specimens of the application of slag or other allied products to new purposes, useful or ornamental," and reference was made to the suggestions contained in my paper. No competitor having presented himself, the premium was withdrawn.

I deposit herewith a printed copy of the paper in your hands for reference.

Yours, &c.,
T. TWINING, Jun.

Twickenham, 3rd April, 1855.

THE DECIMALISATION OF OUR CURRENCY AND ACCOUNTS.

Sir,—In Mr. Rathbone's letter in your last number appears the following quotation:—"There seems little likelihood that while the Americans and the French have *unsuccessfully* attempted to introduce *three* of account, we in England should be satisfied with the comparatively complicated system of *four*."

With no intention to prolong this discussion, I ask permission to observe, that it does not follow because the *decimals* florins, cents, and mils—are to be substituted for the *fractions* shillings, pence, and farthings—ergo, we must adopt *four* coins of account.

It is not necessary that £1, 9 florins, 9 cents, and 9 mils, should be entered under *four* distinct coins of account, when it is evident the same may be expressed in *one* coin, as £1·999; or under *three* separate columns, £1, 9 florins, and 99 mils. The cent in *account* is unnecessary.

The argument that, because you adopt the decimal term cent, for brevity of expression, you must necessarily introduce it for the purpose of account, if worth anything, would apply to every coin in use; and, therefore, because at present we have 12 coins in circulation, we must also have 12 coins of account.

A rich specimen of what logicians call *dicto secundum quid, ad dictum simpliciter*—"That which is bought in the shambles is eaten for dinner; raw meat is bought in the shambles; therefore, raw meat is eaten for dinner."

Yours, &c.,
JAMES S. TRIPP.

Kew Green, March 17th, 1855.

DECIMAL COINAGE.

Sir,—In the Journal of the 19th of May last, I suggested that the rendering of accounts *in terms of one denomination only*—the unit being a defined weight of silver, namely, 1¾ grains, to be termed the "coin" of account—would accomplish the desired reformation in our monetary system, with the least possible difficulty and inconvenience to the public.

Since then I have tried various experiments to discover practical objections, if any, to the use of the existing money tokens, regarded as multiples of the proposed "coin;" and because facility in counting so as to make up any required sum, is obviously the first essential, I endeavoured to realise in my own mind the degrees of difficulty likely to be experienced by persons totally ignorant of arithmetic, such as, unfortunately, the great mass of the humbler classes.

Thus, in purchasing an article costing 47 "coins," to be paid for with pence, halfpence, and farthings, a person would have to count by fours, twos, and ones; and if he happened to be unpractised in the multiplication table, he would certainly find the first of these operations so troublesome, that I doubt the propriety of allowing the "coin piece" to stand part of the system. If suffered to remain, as some propose, in conjunction with a "rimpenny" counting *five*, the matter would be much worse, as may be verified by asking an illiterate servant girl to add up the following numbers in the order given:—5, 4, 5, 4, 4, 4, 5, 4, 4, 5, 1, 2.

Addition by fives, however, would present very little difficulty to the smallest intellect, and here I would venture to propose a measure which has not hitherto, to my knowledge, been even hinted at, namely—let all the existing penny tokens, with or without rims, count as *fives*, the halfpennies and farthings still counting as twos and ones respectively.* The table will then stand thus:—

3 copper	Farthing, equivalent to	1	coin	
	Halfpenny	2	coins	
	Penny	5	,,	
5 silver	10-coin piece	10	,,	
	20-coin piece	20	,,	
	(Sixpence)	25	,,	(temporary)
	Shilling	50	,,	
	Florin	100	,,	
	(Half-crown)	125	,,	(temporary)
	200-coin piece...........	200	,,	
	(Crown)	250	,,	(temporary)
2 gold	Half-sovereign	500	,,	
	Sovereign	1000	,,	

I think it will be found, on close investigation, that the plan here proposed presents fewer objections to an immediate adoption than any other which has been made public.

I remain, sir,
Your obedient servant,
SAMUEL A. GOOD.

H.M. Dockyard, Pembroke-dock, 16th April, 1855.

P.S.—It has occurred to me that the word "cash" would be preferable to "coins" in speaking of sums of money. For instance, "Price, 37 cash" seems to sound better than "Price, 37 coins." If the terms "cent" and

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* Of course the immediate issue of new copper tokens, with the numbers stamped on them, would be advisable, and the old ones should be withdrawn from circulation as soon as possible.

"mil" were applied in their natural sense, as brief synonyms for the words "hundred" and "thousand," instead of "hundredth" and "thousandth," as some propose, the names "florin" and "pound" might be dispensed with, and we should have the following convenient table:—

100 cash make 1 cent.
10 cent make 1 mil.

This expression would accord with the technical expression "per cent." which would then signify "per hundred cash."

TAKING OUT PATENTS.

Sir,—I took out a patent in January, 1855, for an invention for "Constructing vehicles without axletrees, and thus affording an improved method of lowering the body of the vehicle." On going to town with a view to dispose of my invention, curiosity led me to visit the Free Library of the Commissioners of Patents, where I found, on inspecting the printed indexes, that a patent (No. 4581) had been taken out in 1821 for the very same thing, though my patent agent had informed me that he believed my invention was quite new. Had I possessed the means of access to these indexes in my native town so fatal a mistake could not have occurred; but, as it is, being only a working mechanic, the blunder will, in all probability, lead to the most injurious results.

I am, Sir, yours, &c.
WILLIAM TOWNSEND.

Coventry, April, 1855.

Proceedings of Institutions.

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Barnstaple.—The completion of the first decennial period of the existence of the Literary and Scientific Institution was celebrated on the 10th inst. by a *soirée*, which was honoured by the presence of Viscount Ebrington, Chairman of the Council of the Society of Arts, and W. F. Rock, Esq., of London, a munificent patron of the Institution. Upwards of 400 persons, consisting of members and their friends, were present on the occasion. A report had been previously published by the Committee, reviewing the progress of the Institution from its foundation, and recurring to the somewhat peculiar circumstances which attended its origin. Early in the year 1845, when a movement was on foot for the establishment of a Literary and Scientific Institution in the town, not without some misgiving as to its ultimate success, Mr. Rock, a native of Barnstaple, announced his desire of supporting such an undertaking, and proposed to contribute an annual sum of £100 for the purpose. The Institution was consequently founded, and on a comprehensive scale, embracing not only the usual features of reading and newsrooms and library, but likewise the promotion of popular education by means of lectures, a system of class instruction, and a museum; and the generous assistance of Mr. Rock has been continued to the present time. The history of the past ten years will be illustrated by the following abreviated Statistical Table:—

Year ending in March.	Total Number of Members.	Strangers introduced.	LIBRARY.				LECTURES.			Total number of Classes.	Total number of Pupils.	FINANCE.	
			Volumes.	Volumes presented.	Circulation.	Circulation per head.	Literary.	Scientific.	Total.			Total Income.	Total Expenditure.
												£ s. d.	£ s. d.
1846	430	218	2,070	1,790	4,896	11·3	7	16	23	4	72	456 11 0	371 14 4
1847	393	160	2,360	67	6,160	15·6	7	14	21	2	56	369 14 10	370 12 11
1848	368	124	2,680	161	7,432	20·2	3	4	7	1	22	311 0 4	310 13 9
1849	338	135	2,970	22	6,966	20·6	4	3	7	—	—	281 3 7	280 16 4
1850	326	108	3,101	18	6,308	19·3	6	5	11	1	26	273 11 11	273 2 7
1851	328	107	3,233	40	7,239	22	3	7	10	2	43	276 11 2	284 11 11
1852	333	89	3,403	87	6,761	20·3	4	4	8	1	30	285 2 9	278 14 3
1853	339	90	3,570	53	6,178	18·2	2	3	5	2	45	265 11 8	260 3 6
1854	325	82	3,750	18	6,168	19	5	—	5	4	86	262 0 7	263 19 9
1855	307	118	4,025	117	5,165	16·8	7	2	9	6	109	270 15 1	272 11 9
	3,487	1,231		2,373	63,273	18·3	48	58	106	23	489	3052 2 11	2967 1 1

The arrangements for the *soirée*, to which allusion has been made, were admirably carried out by a special committee On the walls of the large lecture-room were hung upwards of a hundred choice paintings, contributed for the occasion from various private collections in the locality, and the high class of which will be evident when it is stated that they included works by Raphael, Da Vinci, the Caracci, Salvator Rosa, Claude, Zuccherelli, Wouvermans, Teniers, Vandyck, Lely, Kneller, and Reynolds. Two rooms were devoted to the beautiful collection of photographs, nature-prints, and chromo-lithographs, lent by the Society of Arts; another to miscellaneous local photographs, and a superb series illustrating Venice. In the library were a few choice engravings and water-colour drawings, and the tables were occupied by a crowd of microscopes, and a group of stereoscopes (kindly lent by the Society of Arts), which were well exercised during the evening, to the infinite amusement of the visitors. Another room was devoted to a series of illustrations of the war; and another, filled with a collection of fine engravings, after Hogarth's popular works, recalled the associations of the last century. In the museum were arranged a variety of works of art, derived from various sources—stained glass, the tasteful work of Beer, of Exeter; *terra cotta* articles from Blashfield, casts of architectural ornaments from Brucciani, besides Italian bronzes, porcelain, artificial flowers of great beauty, series of monastic seals, &c., &c., contributed from the neighbourhood. An interesting arrangement of local fossils, and specimens of the woollen manufacture of the town, were also exhibited. The assembly was presided over by the mayor of Barnstaple, John Harris, Esq., by whom and the hon. secretary of the institution, J. R. Chanter, Esq., it was successively addressed; the latter, on behalf of the committee, presenting to Mr. Rock, a handsomely bound volume of the ten years' Transactions, in graceful recognition of his liberal and disinterested regard for the intellectual welfare of the inhabitants of his native town. The Right Hon. Viscount Ebrington, M.P., then addressed the crowded audience in happily-expressed terms, remarked on the earlier course of the Institution, which exhibited the usual burst of enthusiasm at the outset, the rapid decline, and slow but healthy revival, which was the best evidence of the soundness of the undertaking. He asked particular attention to the arrangements of the Society of Arts for the examination of the classes of Institutions, and predicted much benefit therefrom. Mr. Rock feelingly expressed his great gratification at the scene around him, and rejoiced in the numerous results of his own efforts and those of the committee, of which he had been made aware. He concluded by introducing Edward Capern, a poet, whose talents had been developed within the institution. Mr. Capern then recited a selection from his poetry with great energy and effect. In the intervals of the foregoing incidents, some excellent pieces of music, glees, &c., were performed by a highly-efficient amateur orchestra, and during the evening, tea and coffee were dispensed in a temporarily-covered space, called the "parterre," tastefully decorated with evergreens, and lighted with a profusion of variegated lamps. The exhibition of paintings, photographs, and works of art, was kept open to the public on the two succeeding days.

Bedford.—On Wednesday, the 11th inst., Lord Charles J. Fox Russell gave a very interesting lecture on the "Normans and Normandy." Thomas Bernard, Esq., mayor, presided. A hearty vote of thanks was given to his lordship for his kindness in delivering the lecture. The annual meeting of members was held in the previous week, W. Blower, Esq., M.P., in the chair, when the vice-president, treasurer, secretary, librarian, and auditors were unanimously re-elected, and the vacancies in committee filled up. Mr. Coombs, the secretary, read the Report, which stated that the number of members had somewhat increased during the year, the library had been enriched with many good books by purchase and donation; among the donors was the late Ambassador to St. Petersburgh, Sir Hamilton Seymour. The Treasurer reported a handsome balance in hand—and the society's affairs were altogether in a most prosperous condition.

Cheltenham.—A second course of lectures to the working classes has been delivered at the Literary and Philosophical Institution. The subjects were: "On the Seasons, as treated by the poet Thompson," by the Rev. R. Greaves; on "Mental and Moral Heroism," by the Rev. A. M. Brown, LL.D.; on the "Eddystone Lighthouse," by the Rev. C. H. Bromby; on the "Life of Edward Baines, as Illustrative of Self-Advancement," by W. M. Tartt, Esq.; on "Sanitary Reforms and the Health of Towns," by H. Dangerfield, Esq.; and on the "Use of Knowledge, and how to get it," by T. Wright, Esq., M.D. On the termination of the course, the working men intimated their intention of having a tea meeting at the Town-hall, at which their thanks would be offered to the gentlemen who had lectured, and they were invited to be present. It took place on Wednesday in last week, under the presidency of the Rev. C. H. Bromby; there was a very full meeting, and both those who encouraged, and those who were likely to benefit by the progress of education, passed a most gratifying evening. After tea, an excellent selection of vocal music was given between the addresses (chiefly of a practical character) which were delivered on the occasion; one of the best of which was by Mr. Garrison, a working man, and an active promoter of the lectures.

Clapham.—The Lecture course of the Literary Institution closed on the evening of the 30th ultimo. Mr. Topham lectured on "Shakspeare's Incidental Teaching" to the largest audience of the session. The lecturer said, that even Shakspeare's marvellous poetry was rivalled by his humanising philosophy. He drew attention to much of his counsel, which was illustrative of the loftiest axioms of Christian morality; and gave many illustrations from his dramas, wherein Shakspeare practically enforced the truth of his own phrase, "kindness is nobler ever than revenge." Shakspeare, it was said, always discouraged any manifestation of scornfulness, and so depicted the lowly as to bring out the "one touch of nature that makes the whole world kin." The mountaineers in Cymbeline, notwithstanding their "rude" lives, are represented as full of sympathy and tenderness. The Apothecary, in Rome and Juliet, is so depicted as to arouse compassion for poverty tempted into crime. The Magician, in the "Tempest," is so sketched as to impress us kindly and compassionately for those who at this period had to endure the penalty of burning at the stake; and his representation of the mob, in the historical plays, although thought by some to be a depreciation of the people, rather tends inferentially to teach the necessity of spreading knowledge and education among them. The lecturer touched most ably upon a variety of other topics—Shakspeare's general portraiture of humanity—his views as to the government of the world by Providence—his winning female delineations—and finally his feelings as to patriotism—that principle with him being specially identified with *gratitude* for *national justice*. A unanimous vote of thanks was given to the lecturer.

Hastings.—The Lecture Session was brought to a close on Monday evening, April 2nd, when Frederick North, Esq., M.P., one of the Vice-Presidents of the Institution, gave a lecture "On the Geography and Characteristics of Eastern Europe." The Swan Assembly-room, which had been engaged for all the lectures since Christmas, owing to the limited accommodation in the Institution's own premises, was densely crowded. The honourable gentleman gave a lucid description of the Eastern parts of Europe and their inhabitants, their physical and intellectual qualifications, and interspersed his description with reflections, tending to place Western Europe and its inhabitants in striking contrast with the East. Protestantism and intellectuality seemed to go hand in hand in the progress of the human race and the inhabitants of the West, with their institutions and modes of government. The honourable member advocated the means taken by Mechanics' Institutions in diffusing knowledge by means of public lectures, and expressed a hope that succeeding courses would be even more successful than the past. The president, George Scrivens, Esq., occupied the chair. The session just terminated has been one of the most prosperous, as far as regards numerous audiences, of any in the history of the Institution. This has been mainly owing to the fact, that the committee, on principle, encourage nothing of a light and frivolous character in the lecturing department, but aim at imparting instruction rather than amusement, being of opinion that Mechanics' Institutions are not the vehicles for finding amusement for the people. The following lectures have been delivered during the session:—Two on "Geology," and one on "Phrenology based on Ethnology," by Mr. D. Mackintosh; two on "Oxygen and Hydrogen Gas;" one on "Electrical Conductors, and Non-Conductors;" and one on "Time," by Mr. John Banks; also one on the "Stars," by the same gentleman; one on "Eastern Habitations;" and one on "Australia and her Gold Fields," by the Rev. John Stent; one on the "Geology of Hastings," by Mr. Joseph Pitter; one on "Little Things," by the Rev. G. Stewart; one on "Botany," by Mr. Keyworth; one on "Local Botany," by Mr. Arthur Ransom; one on "Crime and its Remedies," by Mr. R. Dawson; one on "Chronology," by Mr. Womersley; one on the "Homes of the Middle Ages," by Mr. W. Caveler, President of the Literary Institution, Margate; one on "Oliver Goldsmith," by Mr. T. Hudson, of London; one on the "Pendulum," by Mr. Dobell; and one on "Joan of Arc," by the Rev. R. N. Young. With the exception of five of the above, the lectures were by members of the Institution, and many of them have been delivered during the winter at other Institutions in the county which are in union with the Society of Arts. Endeavours will, in all probability, be made by the committee to obtain, ere another session, more commodious premises. The Institute at present possesses but three classes, owing mainly to their scant accommodation.

Liverpool.—The public lectures delivered during the spring at the Collegiate Institution have been as follows: Two by Byerley Thompson, Esq., on the "Army and Navy;" two by J. M'Cann, Esq., on "Extinct Animals;" and two by T. C. Archer, Esq., on "Silk and Wool."

Repton.—The first annual report of the Institute states that there are now 110 members, but comparatively few working-men, or agricultural labourers. The Savings' Bank numbers about 140 depositors, by whom the sum of £150 has been deposited. The library contains 350 volumes. A Recreation Club has been established in connection with the Institute.

Royston.—On Tuesday and Wednesday, 13th and 14th March, Dr. Trevethan Spicer (of London) delivered two excellent lectures, at the Mechanics' Institute, "On Physical Geography," which were listened to with marked attention and evident pleasure by large audiences. The lecturer introduced the subject by adverting to the necessity of commencing with the *beginning* in every branch of study, and pointed out the mischief that accrued from plunging in *medias res*, without the precaution of laying a solid foundation, by generalising on science as a whole, before investigating any subject in particular. He gave it as his opinion that the atomic theory was the basis on which the superstructure of scientific knowledge must be raised. That matter consists of ultimate atoms, invisible, indivisible, and indestructible, is the opinion of most philosophers, and that the variety of appearance is due merely to difference of arrangement; so that, although the primary atoms are all alike, and emphatically the same, yet, owing to the mode in which they are united, the variations in the amount of matter, and the extent of interstice, nature provides us with an inexhaustible variety. That the atoms are all identical is proved from the simple circumstance that it matters not what we eat, the result is blood—from which fluid is elaborated, by the mysterious agency of life, all the multifarious components of the human body—bone, flesh, skin, nail, hair, &c. Then, again, how wondrous is the law of form! (Morphology.) Another point to be considered is the connection of the sciences, for it is absolutely impossible to study one branch of knowledge without reference more or less to all the others. Another question of great importance is that of "Destruction and Reproduction." The circulation of nature is constant—the destruction of one form of matter is the creation of another—the death of some organised beings is the creation of others. Thus the earth by its very constitution is eternal, and can only be destroyed by the Almighty hand of Him who called it into existence.—On Tuesday, 3rd April, Mr. Joseph Fearn, of London, delivered an impressive lecture "On the Poetry and Lyrics of Charles Mackay." The lecture was interspersed with critical observations, in which it was shown that the poet always wrote with a holy purpose; and among many other excellent qualities to be found in Mackay's writings, Mr. Fearn signalised the *true-heartedness* which was so conspicuous in all. The large audience separated evidently delighted with the lecture.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 31*st March*, 2*nd*, 3*rd*, 5*th*, 7*th*, 12*th*, 13*th*, 14*th*, *and* 16*th April*, 1855.

Par. No.
145. New South Wales—Copies of Orders in Council.
146. Victoria—Copy of Order in Council.
149. Expiring Laws—Report from Committee.
65. (2) Trade and Navigation—Accounts.
143. Paupers (Scotland)—Return.
147. Chapters—Return.
148. Russian Exports—Return.
152. Education of Pauper Children—Communications.
155. Committee of Selection—8th Report.
162. Wounded Officers (Crimea)—Return.
110. Local Acts (21, Exeter and Exmouth Railway; 22, Llynvi Valley Railway, and Bridgend Railway; 23, Oxford, Worcester, and Wolverhampton Railway)—Reports from the Admiralty.
153. British Spirits—Return.
113. (1) Linseed, &c.—Return.
133. Shipping and Tonnage—Accounts.
165. Steam-ship *Philadelphia*—Correspondence.
82. Cholera (Sandgate)—Report by Mr. Blackwell.
144. Russian Vessels—Return.
160. New Zealand—Correspondence.
146. Victoria—Copy of Order in Council (a Corrected Copy).
161. Quarantine (Gibraltar)—Report by Dr. Baly.
163. Poor Law (Scotland)—Communications.
140. Civil Services Estimates—Classes 1, 2, and 4. (No. 1).
127. Metropolitan Districts Paving, &c.—Return.
154. Commissariat Chest Account, 1853-4.
156. Army before Sebastopol—2nd Report from Committee.
137. Increase and Diminution (Public Offices)—Abstract of Accounts.
63. Bills—Public Libraries and Museums (Ireland).
64. Bills—Marriages (Scotland).
67. Bills—Friendly Societies (as amended by the Committee, and on Recommitment).
69. Education (Scotland).
71. Places of Religious Worship Registration.
73. Parliamentary Representation (Scotland) Act Amendment.
Transport of Stores, &c., to the East—Papers.
Highways (England and Wales)—Receipts and Expenditure.
Steam-ship "Morna"—Report by Commander R. Robertson.
Medical Charities (Ireland)—3rd Report of Commissioners.
Turnpike Trusts—2nd Report by the Secretary of State.
Local Charges upon Shipping—Report of Commissioners (Ireland).
Sardinia (Reciprocal Opening of the Coasting Trade)—Convention.
Turkish Troops (British Service)—Convention.
Public General Acts—Cap. 11 and 12.

Delivered on 17*th April*, 1855.

Fairs and Markets Commission (Ireland)—Minutes of Evidence. Part 2.

Delivered on 18*th of April*, 1855.

151. Appointment of Children (New South Wales)—Copy of Communications.
70. Bill—Free Schools.

MEETINGS FOR THE ENSUING WEEK.

Mon. Antiquaries, 2. Anniversary.
Geographical, 8½.
Tues. Royal Inst. 3. Dr. Tyndall, "On Voltaic Electricity."
Syro-Egyptian, 7½. Anniversary.
Civil Engineers, 8. Mr. J. Barton, "On the Economic Distribution of Material in the sides or vertical portion of Wrought Iron Beams."
Med. and Chirurg., 8½.
Zoological, 9.
Wed. Royal Soc. Literature, 3.
Society of Arts, 8. Lieut.-Colonel Cotton, "On Public Works for India, especially with Reference to Irrigation and Communications."
Microscopical, 8.
London Institution, 12 p.m. Anniversary.
Thurs. Royal Inst. 3. Mr. G. Scharf, jun., "On Christian Art."
Numismatic, 7.
Royal, 8½.
Fri. Philological, 8.
Royal Inst., 8½. Sir Charles Lyell, "On the Origin of certain Trains of Erratic Blocks on the Western Borders of Massachusetts, U.S."
Sat. Royal Inst., 3. Dr. Du Bois Reymond, "On Electro-Physiology."
Royal Botanic, 3¾.
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April* 13*th*, 1855.]

Dated 27*th March*, 1855.

674. J. C. Bourne, Holmes-terrace, Kentish-town—Photographic apparatus.
676. W. Yates, jun., Woburn-place, Russell-square—Treatment of grain from which beer or spirit has been made.
678. J. Getty, Liverpool—Vessels.

Dated 28*th March*, 1855.

680. G. L. Turney, Wood-street, Cheapside—Packing pins and needles for sale.
682. J. S. Perring, Radcliffe—Permanent way.
684. F. E. Hudde and J. B. E. Fouquet, Paris—Pyrometers.
686. W. Dray, Swan-lane—Gear. (A communication.)
688. E. H. Becker, Altham—Projectile.

690. T. McLow, Middle-row, Holborn—Screw propellers.

692. J. Peabody, Old Broad street—Motive power by action of wind. (A communication.)

Dated 29*th March*, 1855.

694. J. Gedge, 4, Wellington-street South—Stopping railway trains. (A communication.)

696. M. J. T. Gillot and C. C. Beauvois, 30, Upper Charlotte-street, Fitzroy-square—Purifying grain, &c.

698. J. Porritt, Stubbins Vale Mills, near Ramsbottom—Steam engines.

700. J. Blair, Glasgow—Hats.

702. J. H. Johnson, 47, Lincoln's-inn-fields—Anchors. (A communication.)

Dated 30*th March*, 1855.

706. H. W. Parnell, 13, Bryanstone-square—Ships and boats.

708. W. Swain, Birmingham—Furnaces.

712. J. Morgan, Manchester—Candles.

714. E. V. Neale, Russell-place, and T. Dawson, King's-arms-yard—Umbrella handles, &c.

716. T. W. Bunning, Newcastle-upon-Tyne—Steam-engines.

Dated 31*st March*, 1855.

718. C. Whitley, Manchester—Drilling machinery.

720. W. Corbitt, Rotherham—Warming and ventilating.

722. W. E. Newton, 66, Chancery-lane—Centre-bits. (A communication.)

724. G. F. Wilson and G. Payne, Belmont, Vauxhall—Treating oils.

726. E. and M. Abbott, Horningsea, Cambridge—Stays.

Dated 2*nd April*, 1855.

728. A. E. L. C. Finimerhaus, Liege—Forcing projectiles.

730. J. Shand, 245, Blackfriars-road—Fire-engines.

732. C. Crews, 8, Montague terrace, Bow-road, and H. G. Gray, St. James's-street—Disinfecting compounds.

734. R. Peyton, Birmingham—Iron gates and fences.

736. W. Lund and W. E. Hipkins, Fleet-street—Cork-screws.

Dated 3*rd April*, 1855.

738. R. E. Witty, 9, Torriano-avenue, Camden-road-villas—Reflecting solar light.

740. T. Prideaux, Birmingham—Draining plough.

742. H. Powers, Florence—Tiles.

744. W. E. Gill, Totness, and H. B. Sheridan, Parsons-green—Fish oil.

746. J. Maas and J. Adams, White-hart-yard, Southwark—Mills for grinding grain.

748. H. R. Fanshawe and J. A. Fanshawe, North Woolwich—Waterproof fabrics.

750. M. Evrard, St. Etienne—Drawing compresser.

752. C. Nickels, Albany road, and J. Hobson, Leicester—Weaving pile fabrics.

WEEKLY LIST OF PATENTS SEALED.

Sealed April 13*th*, 1855.

2189.—Sir James Caleb Anderson, Bart., Fermoy—Improvements in locomotive engines.

2191. Charles Frederick Stansbury, 17, Cornhill—Improved apparatus for heating buildings.

2193. William James Barsham, Stratford—Improvements in machinery or apparatus for crushing mineral and other substances.

2195. John Harrison, Brighouse—Improvements in the bosses applied to millstones.

2200. Christopher Holt, New-road, St. Pancras—Improvements in fastenings for the laths of iron bedsteads, couches, and other similar articles of furniture.

2201. Robert Pinkney, 26, Long-acre—Improvements in bottles, jars, and other like vessels, and in the method of stoppering them.

2205. John Henry Pape, Paris—Improvements in the manufacture of boots and shoes.

2208. John Bonnall, Spittlegate, Grantham—Improvements in apparatus for holding oil for lubricating purposes.

2216. George Scheutz and Edward Scheutz, Salisbury-street—Improvements in machinery or apparatus for calculating, and printing the results of such calculations.

2304. John Wainwright, Birkenhead—Improvements in fitting up shops, offices, and other like places and shop fronts.

2314. Thomas Prosser, New York—Improvements in condensers of steam-engines and parts connected therewith.

2488. John Davie Morries Stirling, Blackgrange, Clackmannan, N.B.—Improvements in the manufacture of metallic tubes.

250. George Ritchie, 3, Monmouth-place, New-cross, New Kent-road—Improvements in beds or mattresses.

282. William Sandford Roberts, Lodersville, Susquehanna, U.S.A.—Coupling railway carriages.

284. John Grainger, Birchwood, Alfreton—Improvements in the manufacture of pantiles.

290. George Tomlinson, Bousfield, Sussex-place, Loughborough-road, Brixton—Improvements in looms for weaving ornamental figured fabrics, and in the constrution of the rollers to be used upon the pattern chains of such looms.

306. William Bridges Adams, 1, Adam-street, Adelphi—Improvements in the construction and application of elastic springs for sustaining loads or moderating concussion in fixed or moving machines or carriages.

Sealed April 17*th*, 1855.

2218. Louis Cornides, 4, Trafalgar square, Charing-cross—An improved apparatus for amalgamating the gold and silver contained in pulverized ores.

2221. Alfred Illingworth and Henry Illingworth, Bradford—Improvements in machinery or apparatus for combing wool and other fibrous substances.

2223. Robert John Chippindall, 39, Rue de la Rochefocauld, Paris—An improved pencil case.

2230. John Mason and William Robertson, Rochdale—Improvements in machinery or apparatus for preparing and spinning cotton and other fibrous substances, part of which improvements is also applicable for shifting straps by which motion is communicated in other machines.

2236. Samuel Mason and William Beeby, Northampton—Improvements in the manufacture of coverings for the human leg and foot.

2237. Peter Armand le Comte de Fontaine Moreau, 4, South-street, Finsbury—Improvements in the construction of grates.

2238. John Platt, Oldham—Improvements in machinery or apparatus for making bricks.

2245. Julius Smith, Gainford-place, Barnsbury-road, and Frank Sandom Thomas, South-terrace, Walworth—An improved apparatus for steering ships and other vessels.

2248. John Jamieson, Oldham—Improvements in steam engines.

2253. Henry Hales, Brighton—Improvements in the machinery for propelling vessels.

2262. François Jean Bouwens, Mechlin—An improved rotary engine.

2267. John Welsh, Greenock—Improvements in extracting liquids from saccharine and other matters.

2272. Richard Roberts, Manchester—Improvements in machinery for preparing and spinning cotton and other fibrous substances.

2284. Charles Henry Olivier, 37, Finsbury-square—An improved apparatus for drying.

2301. Richard Archibald Brooman, 166, Fleet-street—Improvements in centrifugal machines, and in driving the same.

2317. Bewicke Blackburn, Clapham-common—Improvements in the manufacture of pipes.

2377. Ignace Porro, Paris—Certain applications of total or partial reflection of light on transparent surfaces, either alone or combined with the refraction.

2452. Richard Keefe, Nock Mills, near Trim, Ireland—Improvements in dressing flour.

2561. Peter Armand le Comte de Fontaine Moreau, 4, South-street, Finsbury—Improvements in coating and colouring metals and alloys of metals.

2718. Charles Henfrey, Turin—Improvements in the construction of railway for steep gradients, and in the machinery or apparatus employed therein or connected therewith. (A communication.)

2716. Warren de la Rue, Bunhill row—Improvements in treating products arising from the distillation of a certain tar or naphtha to render the same suitable for dissolving or removing fatty or resinous substances.

67. Henry Bessemer, Queen-street-place, New Cannon-street—Improvements in the construction and manufacture of ordnance.

211. Peter Armand le Comte de Fontaine Moreau, 4, South-street, Finsbury—An improved machine for manufacturing thimbles employed on board ship or elsewhere.

239. Martin Samuelson and Alexander Samuelson, Scott-street Foundry, Hull—Improvements in steam-engines.

255. James Timmins Chance, Birmingham—Improvements in the manufacture of pipes or tubes of glass or other vitreous matter.

284. George Audemars, Lausanne, Switzerland—Improvements in obtaining and treating vegetable fibres.

287. John Grove Johnson, 18 A, Basinghall-street—Improvements in surgical bandages.

301. George Fergusson Wilson and George Payne, Belmont, Vauxhall—Improvements in treating glycerine.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
3707	April 18.	Emett's Chimney Top, for the Prevention of Smoky Chimnies, &c. ...	Alfred Emett	13, Mount Pleasant, Liverpool.
3708	„ „	Trench and Portable Cooking Lamp......	Knight, Merry, and Exley	Birmingham.